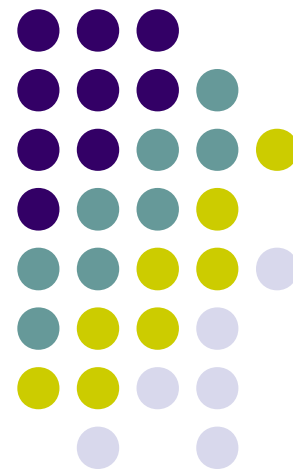


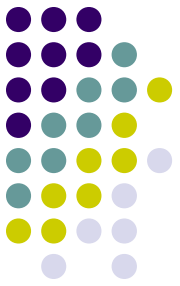
ESG Mapping and Visualization

Eric A. Kihn

NOAA/NGDC

September 16, 2004

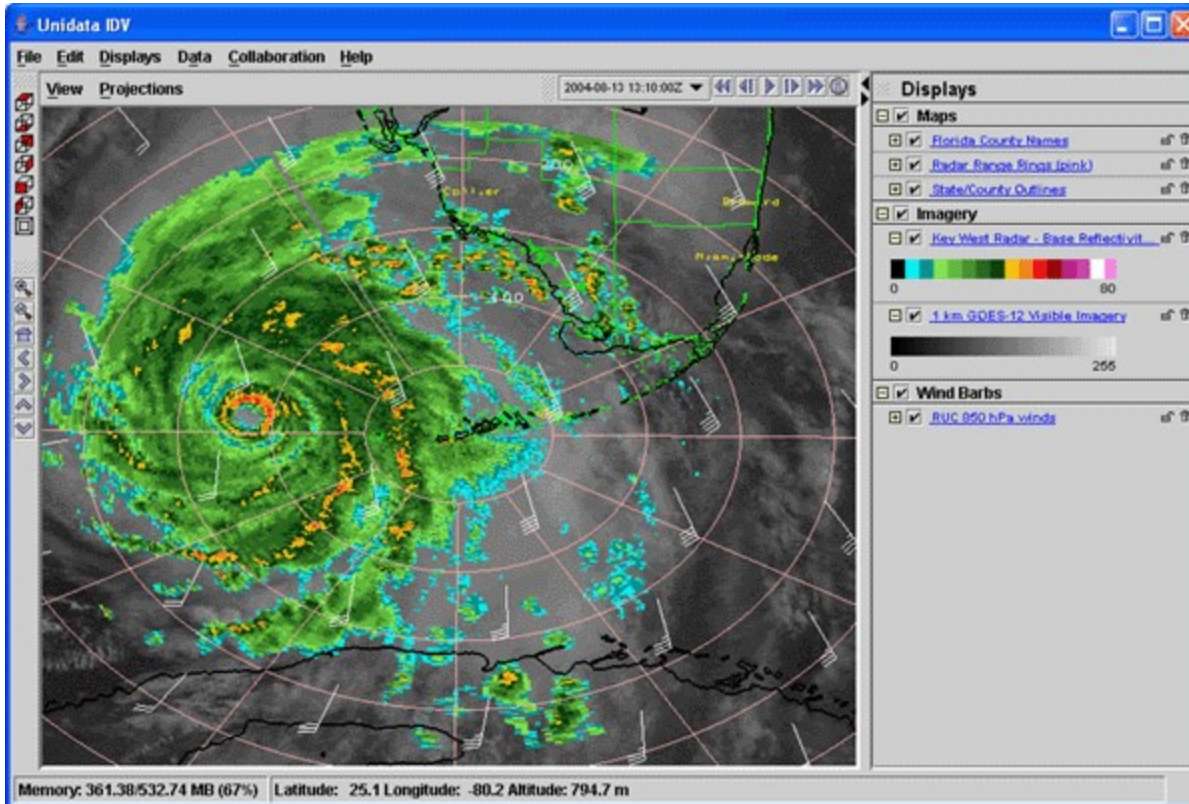
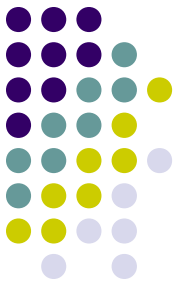




Presentation Outline

- IDV
- OGC-WMS
- NetCDF -> FDR
- Integration and Flow

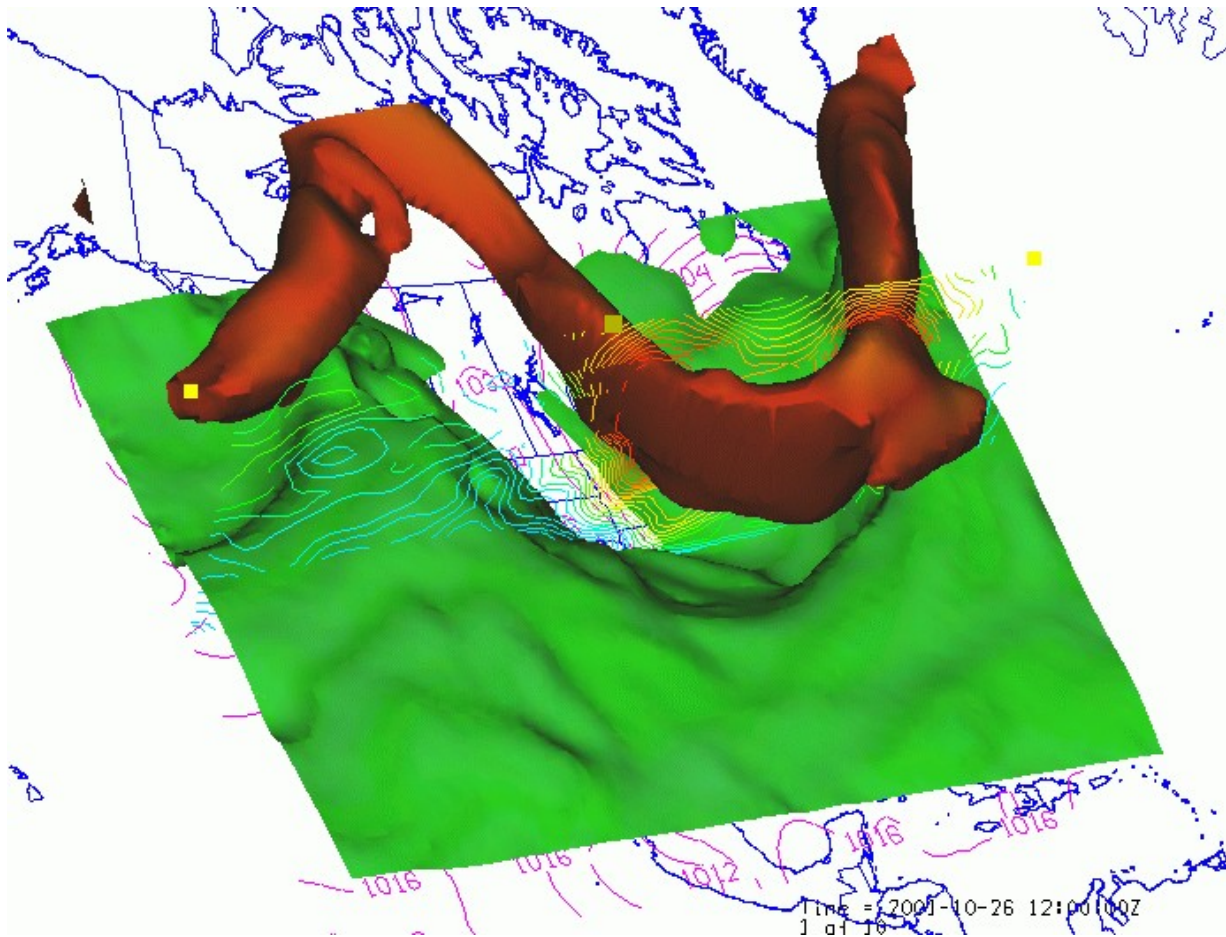
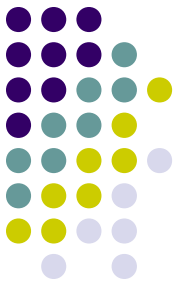
ESG and IDV



Hurricane “Charlie” as viewed in IDV

- IDV is the “Integrated Data viewer from NCAR
- IDV is “open-source” distributed data viewing app
- IDV includes support for many diverse data types
- IDV has broad community support

3-D Visualization in IDV



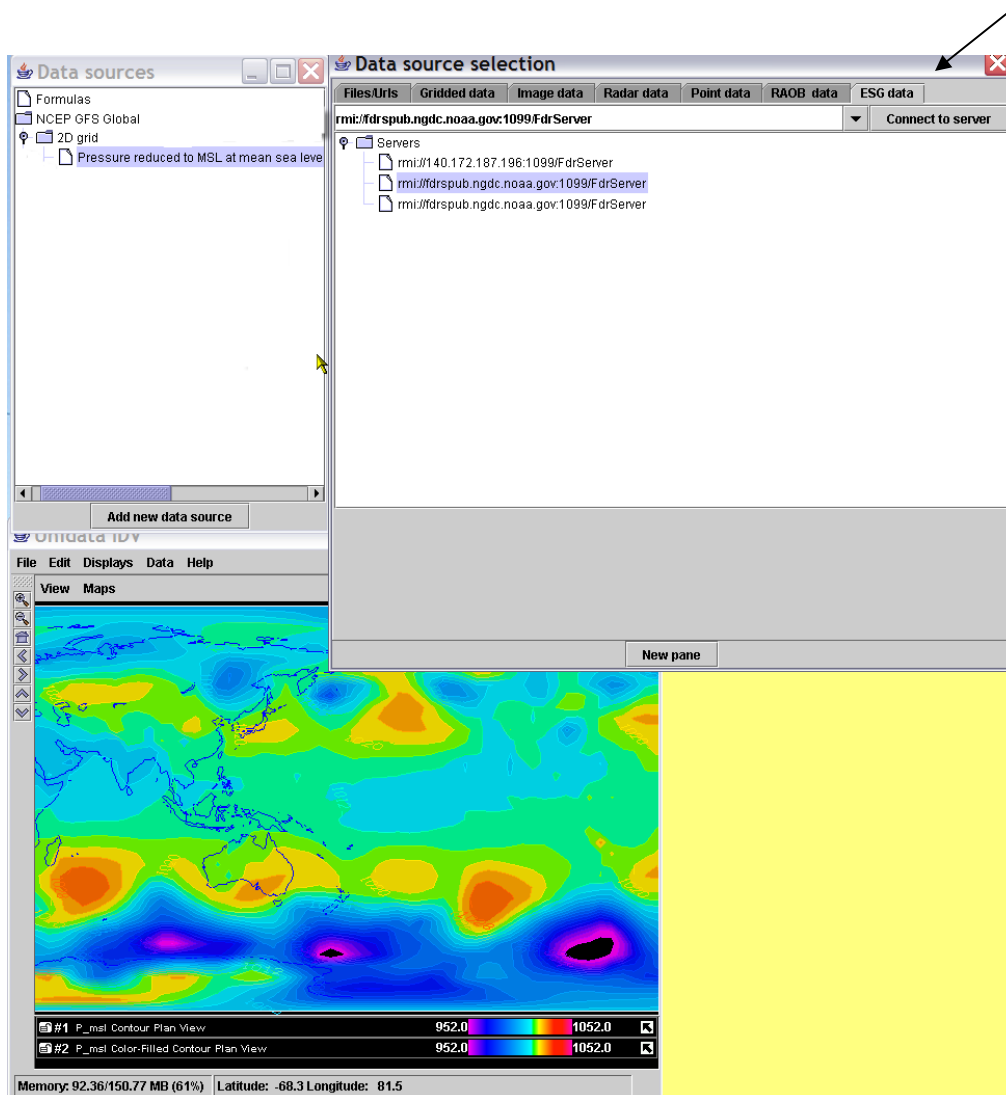
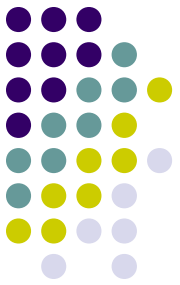
- IDV supports a full range of 3-D Vis.

- It supports probes, planes, time-series data, skew-t diagrams, etc.

- IDV is built on VisAD so it is fully extendable

The jet-stream in 3-D over pressure with temperature contours.

Open-source and ESG



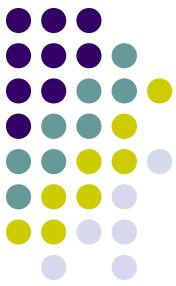
It allows us to integrate our distributed architecture

It allows us to extend IDV as required

It gets us the support of a full community

We benefit from the work of expert developers

IDV is based on VisAD which is also open allowing for very basic extensions of capability

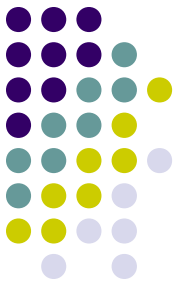


Multiple Format Support

Data Type	Description	Supported Formats	Access method
Gridded data	Numerical weather prediction models, climate analysis, gridded oceanographic datasets, NCEP/NCAR Reanalysis	- netCDF(2) - Vis5D	- local files, HTTP, OPeNDAP servers - local files, HTTP
Satellite imagery	Geostationary satellite imagery, MODIS, derived satellite products	- ADDE (3) - McIDAS AREA	- ADDE servers - local files, ADDE servers
Radar data	NEXRAD Level II and Level III radar data	- Level II - Level III	- local files (bzip2 compressed or uncompressed) - ADDE servers
Point observations	Surface observations (METAR and SYNOP)	- ADDE - netCDF(Unidata, AWIPS formats)	- ADDE servers - local files, HTTP
RAOBs	Global balloon soundings	- ADDE - netCDF(Unidata, AWIPS formats)	- ADDE - local files
Profiler	NOAA Profiler Network winds	ADDE	ADDE servers
GIS data	Data typically used in Geographic Information Systems (GIS)	- ESRI Shapefile - USGS DEM - GeoTIFF (limited support)	- local files, HTTP - local files - local files
QuickTime	QuickTime movies (without extensions)	QuickTime	Local files, HTTP

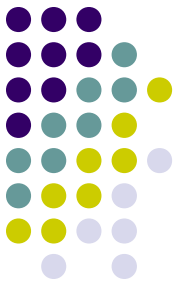
Using the application automatically integrates FDR based data with a host of other local and distributed formats.

Java Web Start



Java Web Start software provides a flexible and robust deployment solution for Java technology-based applications based on the Java Community Process program (JCP)....which provides *a browser-independent architecture for deploying Java 2 technology-based applications to the client desktop*. Java Web Start technology works with any browser and any Web server. Each application developed for use with the Java Web Start software specifies which version of the Java 2 platform it requires, e.g., version 1.2 or 1.3, and each application runs on a dedicated Java Virtual Machine (JVM).

Summary: It lets us deploy a web-enabled application with minimal support requirements and trivial installation



IDV Workshop (Boulder)

Integrated Data Viewer (IDV) Session A: October 18 - October 19 (Monday - Tuesday)

The IDV is Unidata's newest analysis and visualization tool. The workshop will cover installing and configuring the IDV, loading, displaying, and manipulating data, creating custom diagnostic functions, Jython scripting, educational content development, and multi-user collaborative aspects. If there is sufficient interest, the workshop will also cover developer issues such as creating custom applications, adding new data sources, and displays.

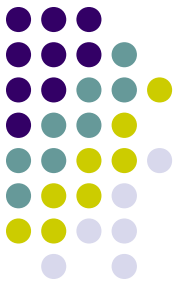
- 1 [Overview of the Integrated Data Viewer](#)
This section provides an overview of the IDV, its purpose and its capabilities.
- 2 [Installing and Starting the IDV](#)
In this section, you will learn how to download and install the IDV from Unidata. You will also learn about starting the IDV from a command line.
- 3 [Accessing and Displaying Data](#)
In this section, we will discuss the data selection process and how to load in most of the types of data that the IDV supports.
- 4 [Saving State and Views](#)
The IDV supports saving application state and creating JPEG images and Quicktime movies.
- 5 [Diagnostic Functions: Formulas and Jython](#)
The IDV provides methods to make computations using data in any IDV data source, and to display the results. You can use simple formulas or program code written in the

The ESG Spatial Challenge



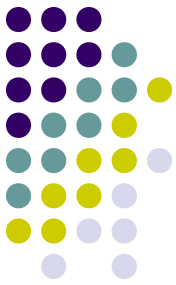
- ESG has need for spatial maps in several locations
- There is a need to display integrated weather and terrain
- The spatial data sources are not clearly defined
- Need the ability to customize to the user community

Open GIS Consortium (OGC)

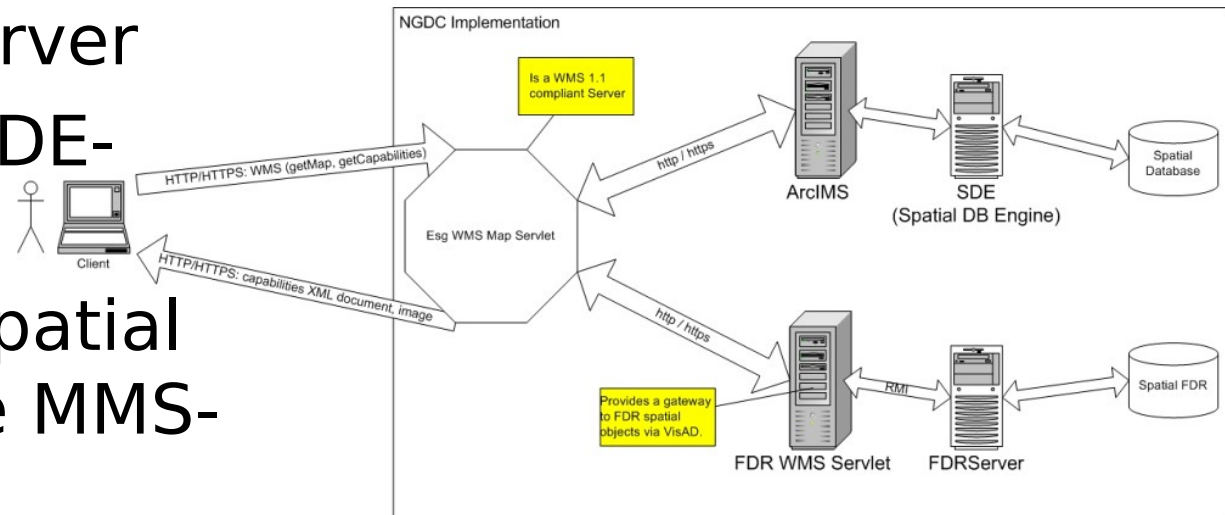


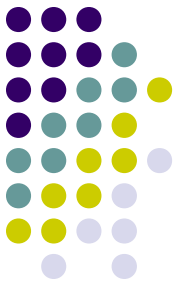
A Web Map Service (WMS) produces maps of georeferenced data. We define a "map" as a visual representation of geodata; a map is not the data itself. This specification defines three WMS operations: **GetCapabilities** returns service-level metadata, which is a description of the service's information content and acceptable request parameters; **GetMap** returns a map image whose geospatial and dimensional parameters are welldefined; **GetFeatureInfo** (optional) returns information about particular features shown on a map. This specification defines a syntax for World Wide Web (WWW) Uniform Resource Locators (**URLs**) that invoke each of these operations. Also, an Extensible Markup Language (**XML**) encoding is defined for service-level metadata.

ESG Spatial Solution



- OGC-WMS Compliant Servlet
- 100 % Java Server
- Uses ArcIMS-SDE-Oracle
- Can use any spatial data server (ie MMS-shape files)
- Uses VisAD for spatial plotting

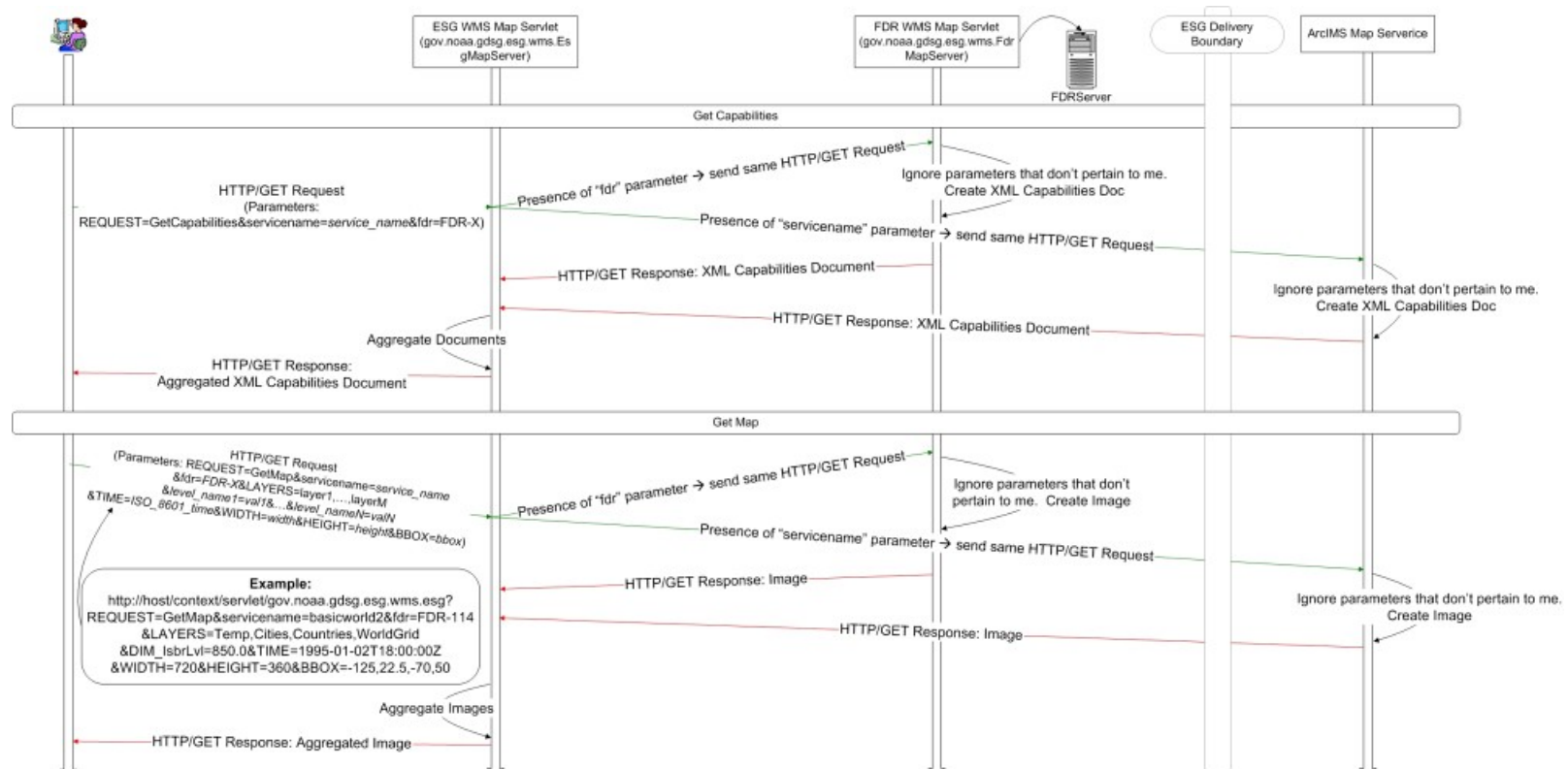
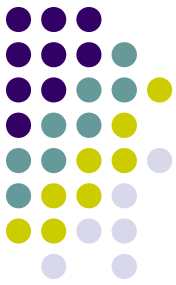




ESG-WMS Benefits

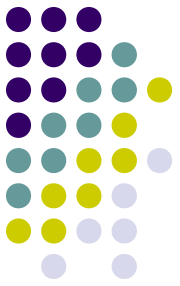
- Open Source
- Uniform across application layers
- Allows for 'cascading servers'
- Support for communities can be built in in several layers
- Fast, distributed, integrated access to spatial data

ESG-WMS Technical Overview



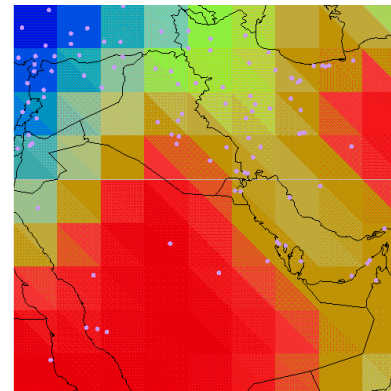
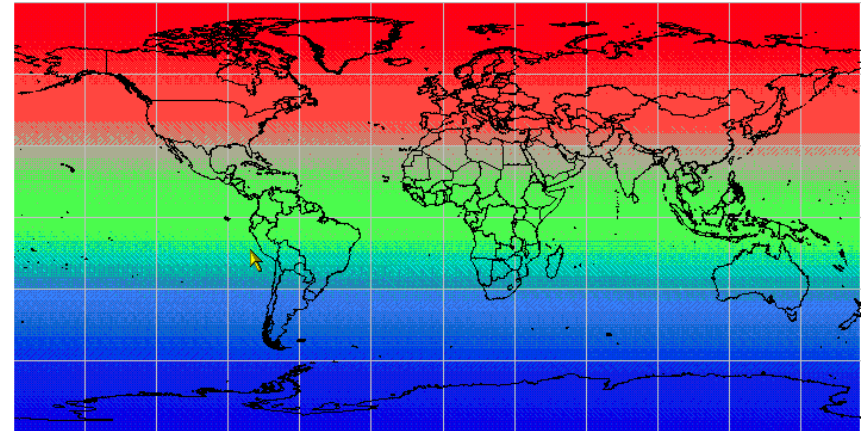
Any allowed application could tie into the ESG mapping infrastructure.

Sample Usage



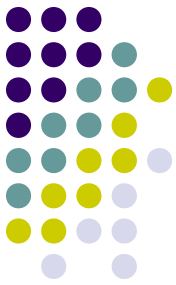
ESG WMS Demo Links

- ♦ [synthetic 5° data \(FDR only\), full-extent](#)
- ♦ [synthetic 5° data \(FDR only\), zoom-in](#)
- ♦ [BasicWorld mapservice \(ArcIMS only\) full-extent](#)
- ♦ [BasicWorld mapservice \(ArcIMS only\) zoom-in](#)
- ♦ [synthetic 5° data, combined with ArcIMS, full-extent](#)
- ♦ [synthetic 5° data, combined with ArcIMS, zoom-in](#)
- ♦ [temperature 2.5° with ArcIMS, North America](#)
- ♦ [temperature 2.5° with ArcIMS, North America zoom-in](#)
- ♦ [relative humidity 2.5° with ArcIMS, North America](#)
- ♦ [relative humidity 2.5° with ArcIMS, Middle East](#)
- ♦ [Ground Wetness 2.5° with ArcIMS, Middle East](#)
- ♦ [WMS GetCapabilities response for FDR-120](#)



<https://gdsg.ngdc.noaa.gov/esg>

NetCDF -> FDR Loader

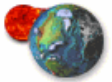


NOAA Satellites and Information

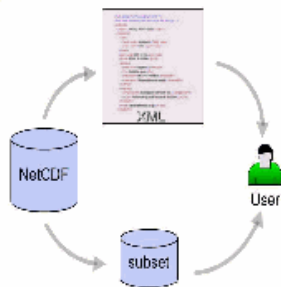
National Environmental Satellite, Data, and Information Service



National Geophysical
Data Center



[privacy policy](#)



NetCDF Translator

The NetCDF Translator is a network distributed software tool designed to translate netCDF archives of environmental data into a format native to the [IDEAS](#) and [ESG](#) software systems. Technologies employed include Web Services (Apache Axis), RMI, XML/XSLT, JSP, Struts, XmlBeans, MySQL

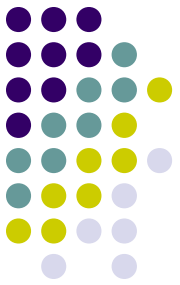
Go to [NetCDF Translator](#)

[NOAA/NESDIS/NGDC](#)
<http://www.ngdc.noaa.gov/>

updated January 30, 2004
[HTML 4.01](#)

questions to:
ngdc.info@noaa.gov

Sample of NetCDF in action



URL to netCDF File:
http://esgdevel.ngdc.noaa.gov/robr_esg_netcdf_server/data/air

Load

Click [here](#) to see a netCDF file repository

Set Spatial Extent

zoom in
zoom out
to rectangle
recenter
go global
reset

N=33, W=-96.048

☒ Geographical
☒ Administrative
☐ Geophysical
☐ Faults
☐ Stress map
☐ World lights
☒ Continents
☒ Lakes&Ocean

[Edit Layer Groups For Map](#)

Regions of interest
please select

Probes of interest
please select

[Zoom to GRID](#) [Clear](#) [Submit](#)

Navigate: [Load](#) → [Temporal Extent](#) → [Spatial Extent](#) → [Parameters](#) ⇒ [Delivery](#)

Available Metadata

```
<netcdf_header>  
<uri>http://esgdevel.ngdc.noaa.gov/robr_esg_netcdf_server/data/air.2004  
<history>created 2004/01/03 by Hoop (netCDF2.3)</history>  
<title>mean daily 500 hPa reanalysis (2004)</title>  
<description>put global description attribute here after removing  
white space</description>  
<temporal_extent>  
</netcdf_header>
```

Set Parameters

Select Parameter n/a n/a [Add Parameter](#)

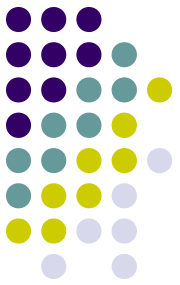
User Selection

air@vertical_level=level@925.0
air@vertical_level=level@500.0

[Delete Parameter](#) [Clear Parameter List](#)

Navigate: [Load](#) → [Temporal Extent](#) → [Spatial Extent](#) → [Parameters](#) ⇒ [Delivery](#)

Final Loading



Delivery Options

Request Id: 2004-04-08_03_34_44_834_-2081180530

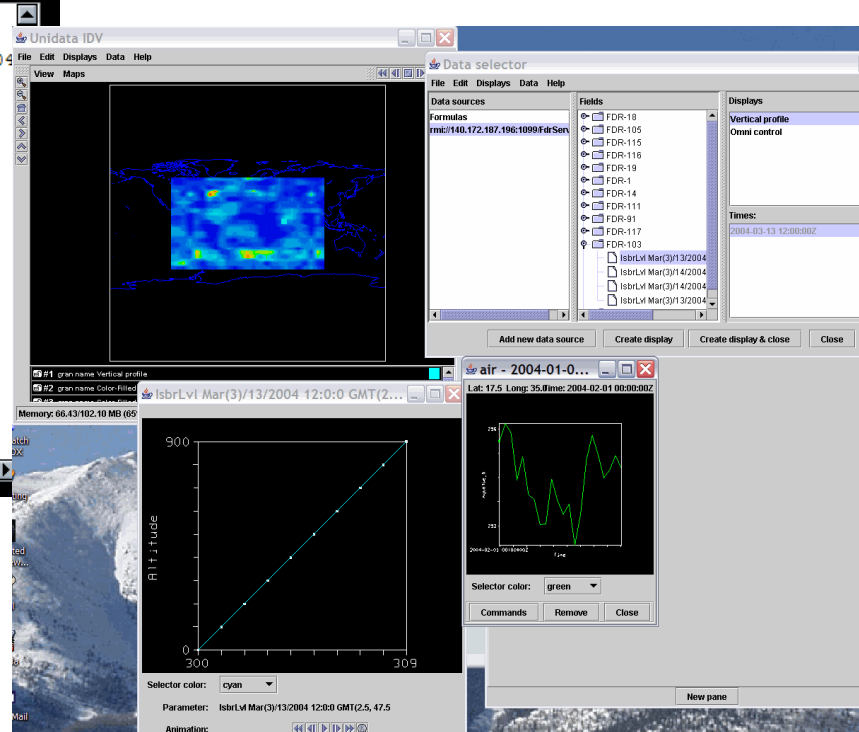
Upon completion, an email will be sent to: Eric.A.Kihn@noaa.gov

Click [here](#) occasionally to check progress.

Navigate: [Load](#) → [Temporal Extent](#) → [Spatial Extent](#) → [Parameters](#) ⇒ [Delivery](#)

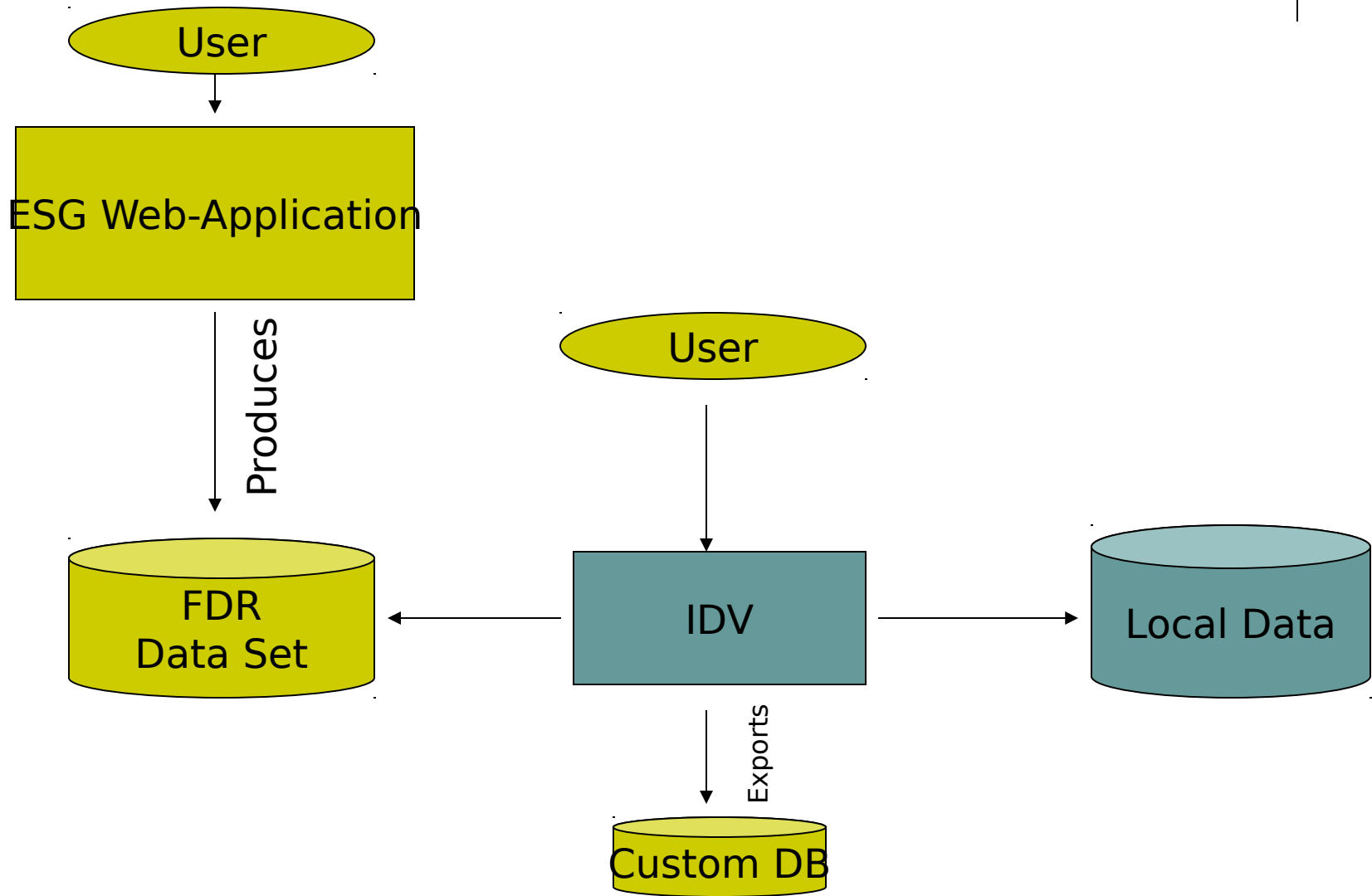
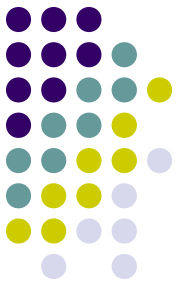
The Request was:

```
<netcdf_request>
<uri>http://esgdevel.ngdc.noaa.gov/robr_esg_netcdf_server/data/air.2004
<temporal_extent>
  <start_time>2004-01-01T00:00:00</start_time>
  <end_time>2004-01-22T00:00:00</end_time>
</temporal_extent>
<spatial_extent>
  <north_min>-50.0</north_min>
  <north_max>30.0</north_max>
  <east_min>-70.0</east_min>
  <east_max>50.0</east_max>
</spatial_extent>
<coverage>
  <parameter>
    <key>air</key>
  </parameter>
  <vertical_level>
    <key>level</key>
  </vertical_level>
  <stratum>
```

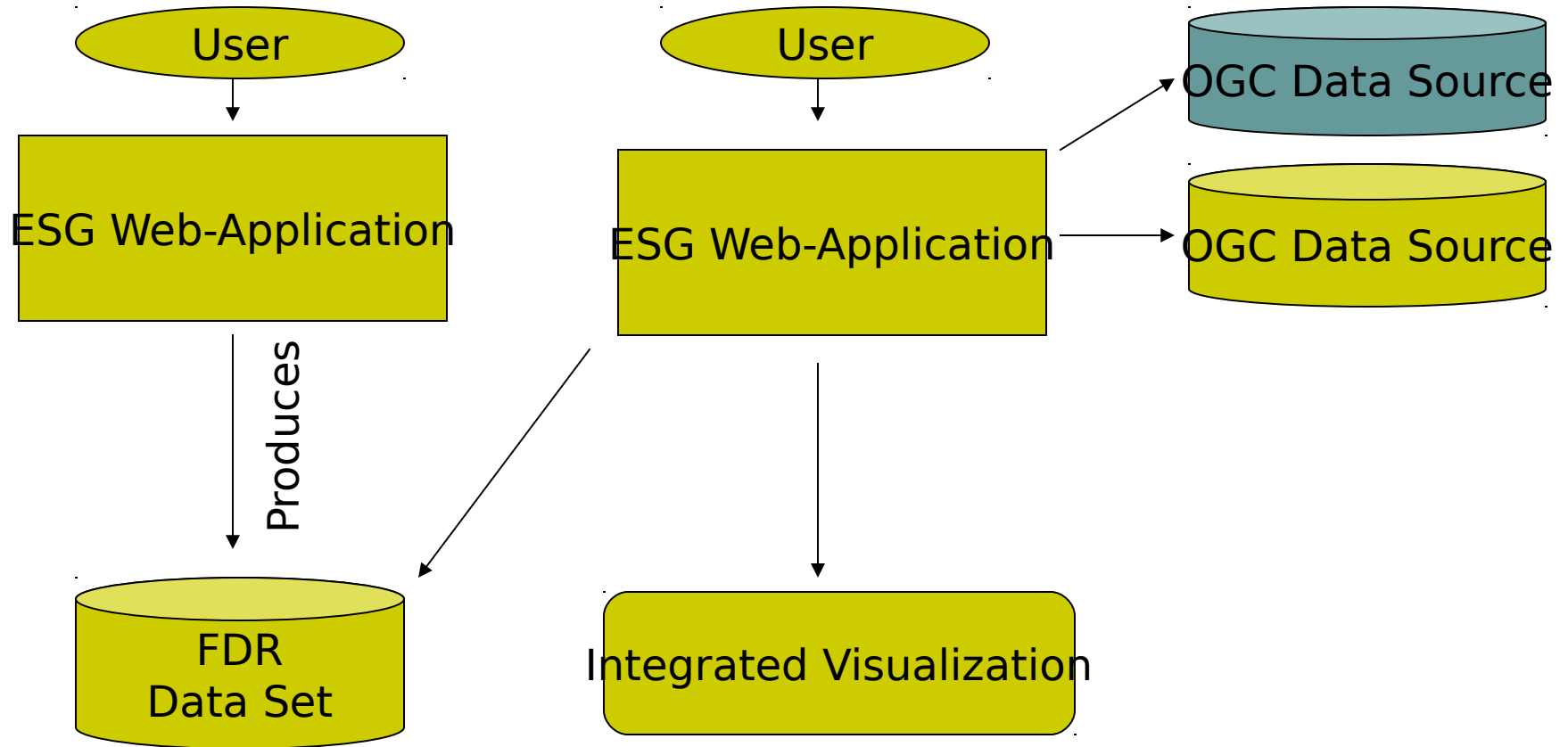
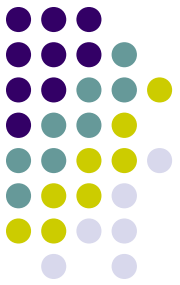


The only thing missing to make this fully available to the ESG system is “catalog metadata”.

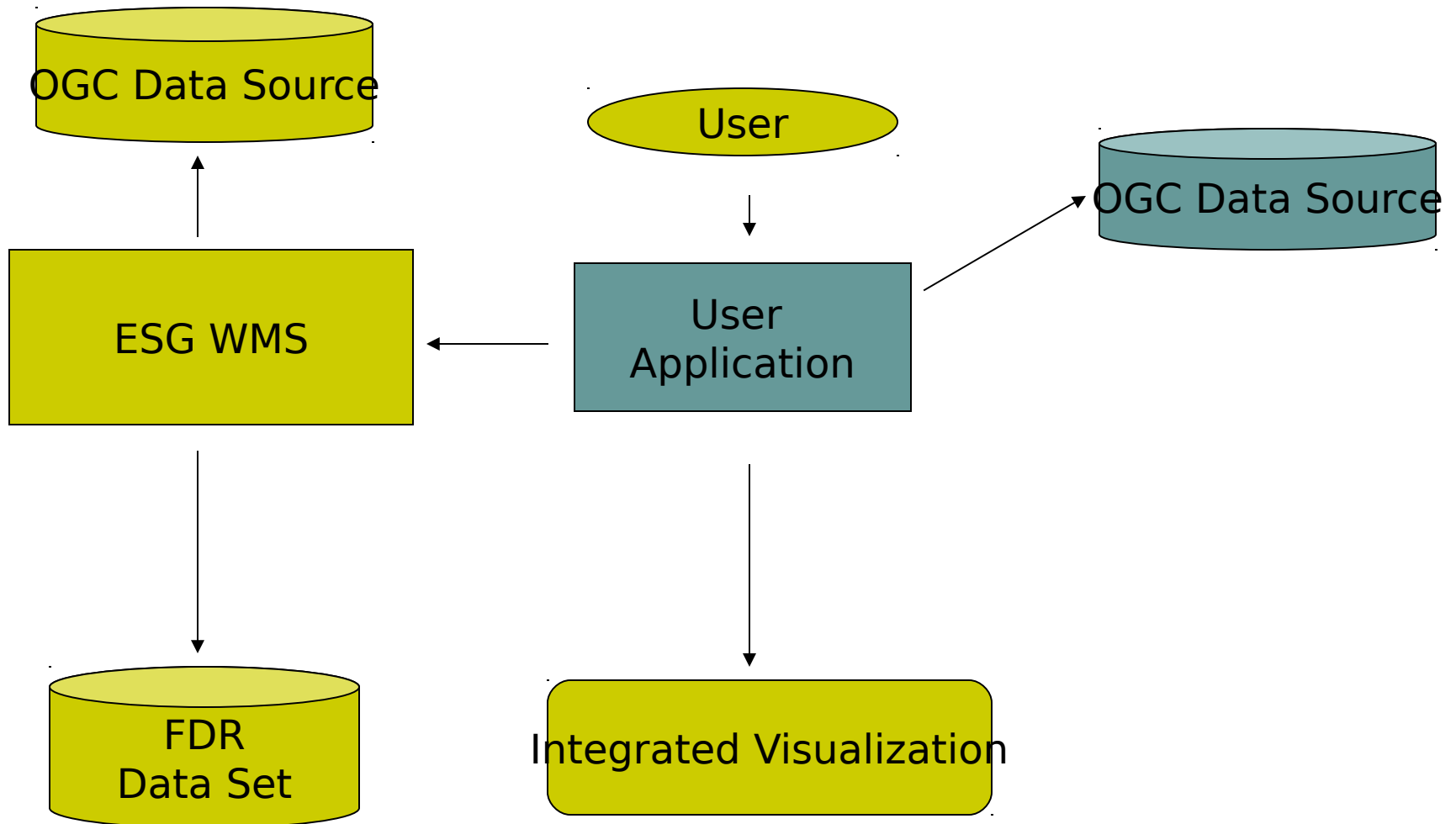
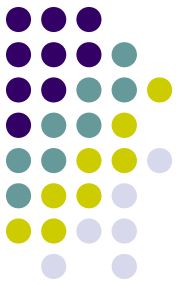
Bringing it together



Mapping Use Case



Mapping Case #2



Next Frontier

